Varicella and Shingles in 2014 — Not the Time for a Lollipop!

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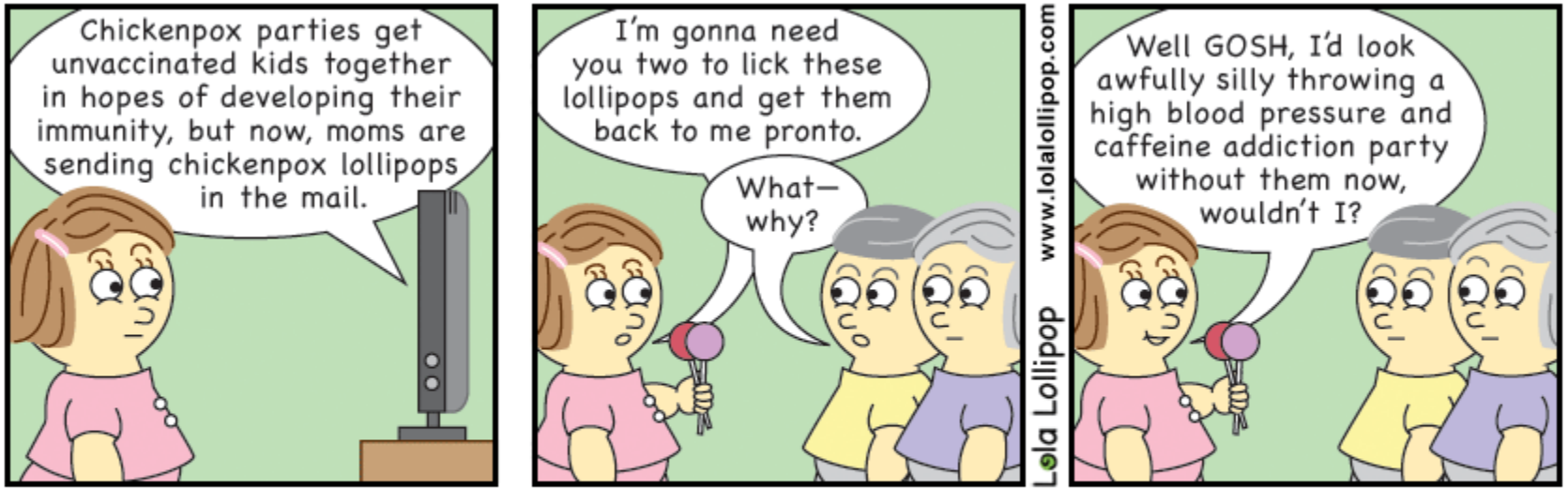
Career Epidemiology Field Officer
Assigned to the Montana Department of Public Health and Human Services

Montana Regional Immunization Meetings
Spring 2014

Office of the Director
Division of State and Local Readiness



"Fear of childhood vaccinations has some parents paying to have a stranger send lollipops and other items purportedly licked by kids with chickenpox, but a federal prosecutor says that in addition to being a bad idea, it's illegal." – DAVID W. FREEMAN, CBS NEWS

https://www.youtube.com/watch?v=IMt15slevvc

http://lolalollipop.com/187-chickenpox-lollipops/

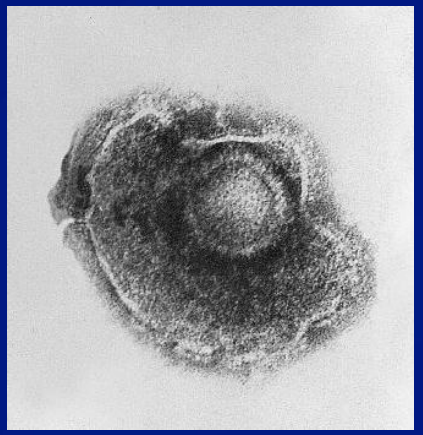
Agenda

1. Clinical and epidemiologic description of varicella and shingles
2. Vaccination recommendations for varicella and shingles
3. Varicella and shingles vaccination contraindications
4. Ways to improve vaccination rates
5. Questions and discussion

VARICELLA (CHICKENPOX)

Varicella (Chickenpox)

- **Varicella-zoster virus (VZV)**
  - Human herpes virus type 3 (HHV-3)



http://en.wikipedia.org/wiki/File:Varicella_(Chickenpox)_Virus_PHIL_1878_lores.jpg

- **Transmission**
  - Humans only source
  - Person-to-person transmission via direct contact, airborne droplets, infected respiratory tract secretions, or direct contact with vesicular zoster lesions
  - Highly contagious — >85% of household contacts of an infected case will become infected
  - Patients infectious 1–2 days before rash onset until all lesions crusted (typically ~5 days)
  - Healthcare-acquired infections well documented

Clinical Description

- **Incubation period typically 14–16 days after contact (range: 10–21 days)**
- **Usually begins with onset of rash exanthema (children)**
  - Generalized, pruritic, vesicular, 250–500 lesions in various stages of development and resolution

http://hardinmd.lib.uiowa.edu/dermnet/chickenpox5.html

http://hardinmd.lib.uiowa.edu/dermnet/chickenpox40.html

Clinical Description

- Adults: can have prodrome of headache, nausea, myalgia, and anorexia
- Systemic symptoms for children and adults include mild fever and flu-like symptoms
- Lesions usually crust over in 4–5 days
- Shorter and milder illness for children
- Longer and more severe illness in adolescents/adults

Complications

- **Bacterial superinfection of skin lesions (staphylococci and streptococci most common)**
  - Impetigo
  - Cellulitis
  - Erysipelas
  - Rarely septicemia, secondary bacterial pneumonia, otitis media, necrotizing fasciitis
- **CNS complications**
  - Reye syndrome, Guillain-Barré syndrome, encephalitis
- **Hemorrhagic complications**
  - E.g., febrile purpura

Complications

- **Persons at higher risk of varicella complications**
  - Infants
  - Adolescents
  - Adults
  - Pregnant women
  - Persons with weakened immune systems

Varicella in Pregnancy

- **Risk for VZV transmission to fetus or newborn**
- **Intrauterine infection can lead to congenital varicella syndrome**
  - Born to mothers infected with VZV during first half of pregnancy
  - Low birth weight, cutaneous scarring, limb hypoplasia, microcephaly, cortical atrophy, chorioretinitis, cataracts, and other anomalies
  - 1.1% overall risk in first 20 weeks of pregnancy (highest risk 12-20 weeks GA)

Sharma S, Sharma V, Sharma NL. Fetal varicella syndrome --- a case report. Curr Pediatr Res. 2012;16(1):5-8.

Varicella in Pregnancy

- Varicella in pregnant women 5 days before to 2 days after delivery results in severe varicella infection in 17–30% of newborn infants
- Infants without sufficient maternal antibody to lessen severity of disease
- Infants born to mother with onset of rash ≤4 days before delivery = 31%
- Use of varicella-zoster immune globulin (VZIG) decreased incidence of severe neonatal varicella disease

Varicella incidence by age (pre-vaccine)

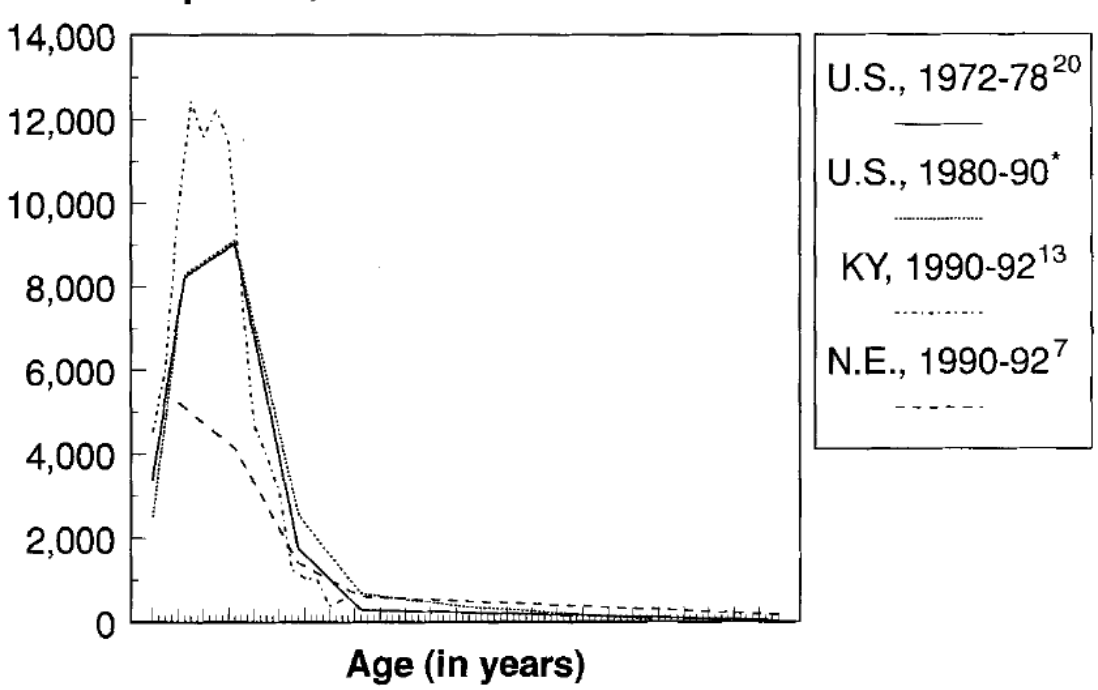


Figure 2. Varicella incidence rate (per 100,000 person-years) by age group as reported in selected studies. All rates are plotted at the midpoint of the age group; age groups differ by study. *CDC, unpublished data, 1993.

Wharton M. The epidemiology of varicella-zoster infections. Infect Dis Clin North Am. 1996;10(3):571-81.

Varicella hospitalizations (pre-vaccine)

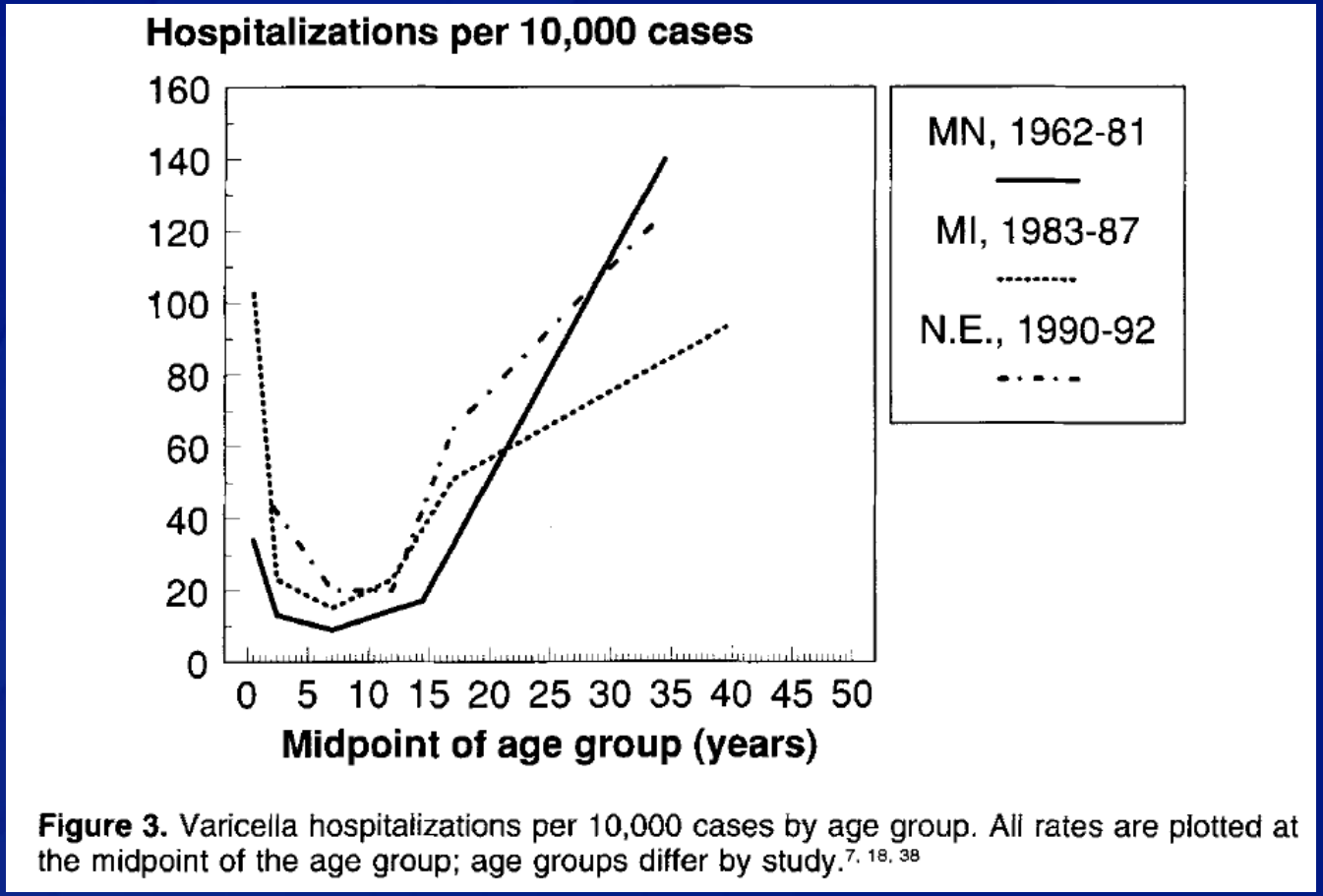


Figure 3. Varicella hospitalizations per 10,000 cases by age group. All rates are plotted at the midpoint of the age group; age groups differ by study.[7, 18, 38]

Wharton M. The epidemiology of varicella-zoster infections. Infect Dis Clin North Am. 1996;10(3):571-81.

Varicella-related deaths (pre-vaccine)

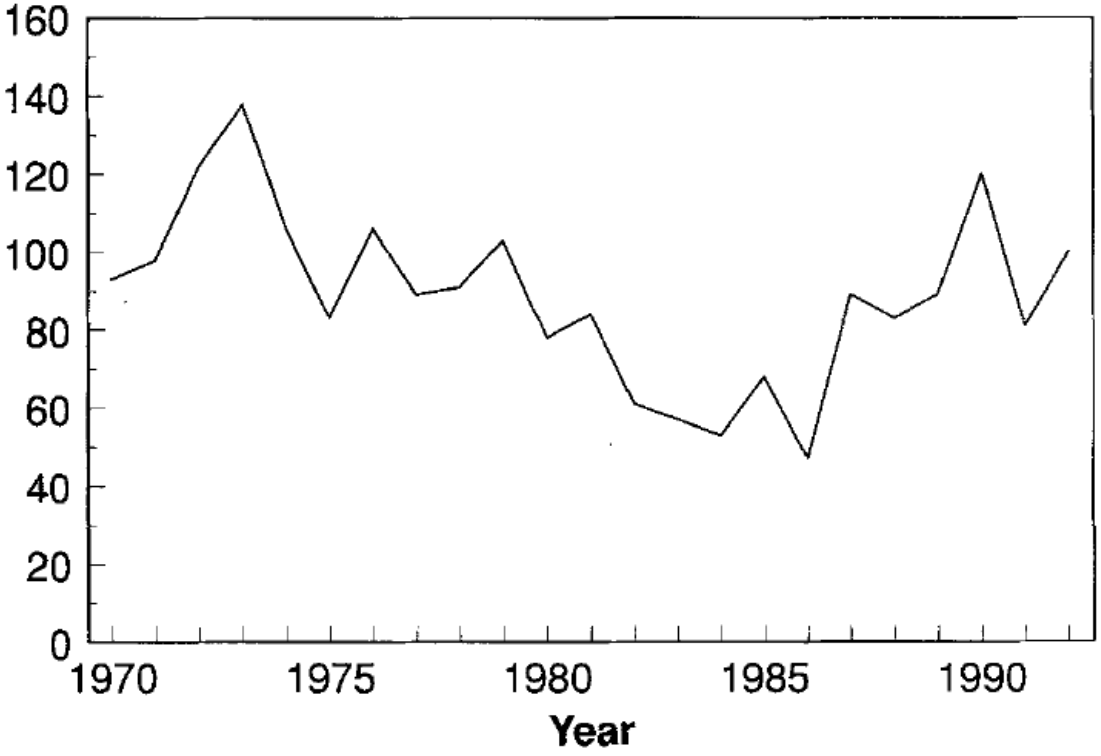
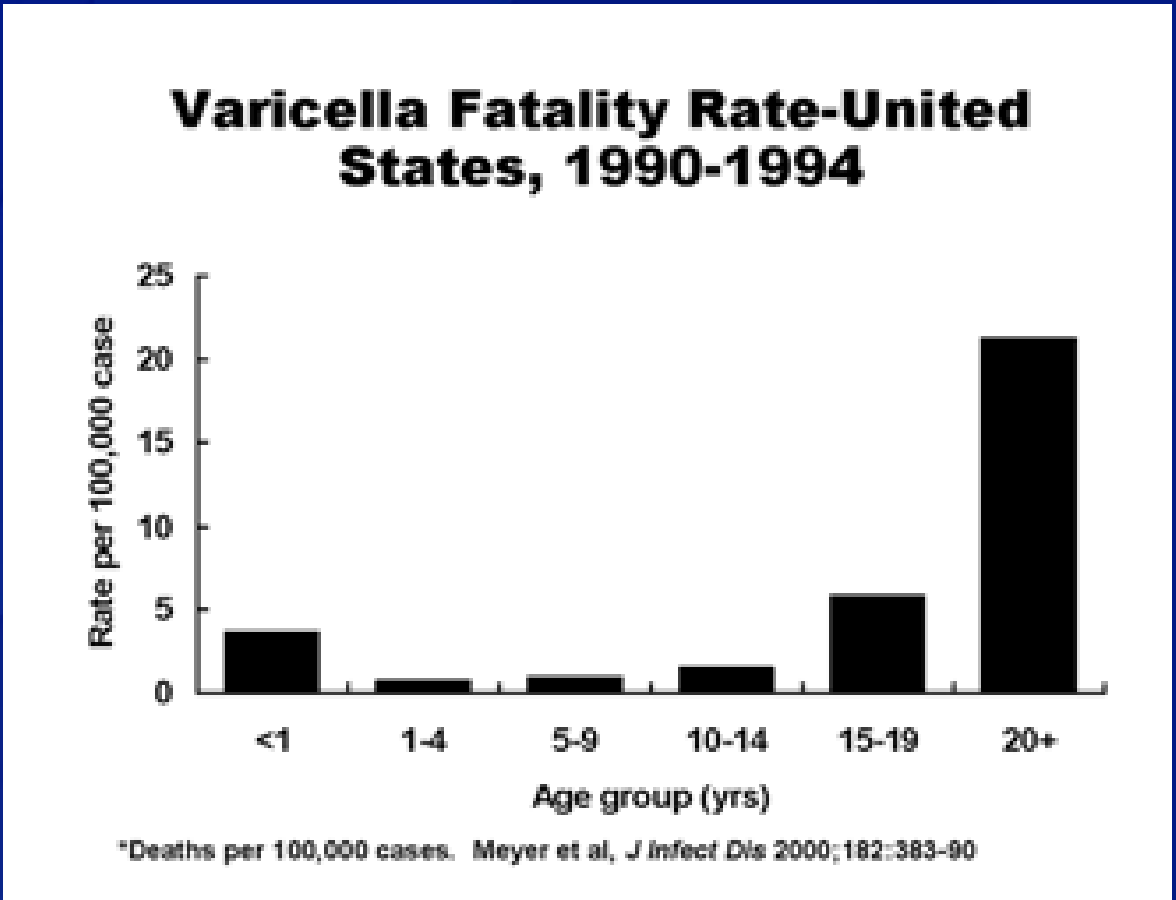


Figure 4. Deaths with varicella as underlying cause, United States, 1970–1992, National Center for Health Statistics, Centers for Disease Control and Prevention.

Wharton M. The epidemiology of varicella-zoster infections. Infect Dis Clin North Am. 1996;10(3):571-81.

Varicella Death Rate by Age



http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/varicella.pdf

Varicella Vaccine

- **Two live attenuated varicella vaccines licensed in United States (Oka strain)**
  - Varicella virus vaccine (VARIVAX®, Merck & Co. Inc., Whitehouse Station, New Jersey)
    - Licensed for use in 1995 among healthy persons aged ≥12 months
    - 0.5 ml dose
    - Does not contain preservatives
  - Combination MMRV vaccine (ProQuad®, Merck & Co., Inc., Whitehouse, New Jersey)
    - Licensed for use in 2005 among healthy children aged 12 months–12 years

Vaccine Recommendations

Figure 1. Recommended immunization schedule for persons aged 0 through 18 years – United States, 2014.

(FOR THOSE WHO FALL BEHIND OR START LATE, SEE THE CATCH-UP SCHEDULE [FIGURE 2]).

These recommendations must be read with the footnotes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars in Figure 1. To determine minimum intervals between doses, see the catch-up schedule (Figure 2). School entry and adolescent vaccine age groups are in bold.

Vaccine	Birth	1 mo	2 mos	4 mos	6 mos	9 mos	12 mos	15 mos	18 mos	19–23 mos	2-3 yrs	4-6 yrs	7-10 yrs	11-12 yrs	13–15 yrs	16–18 yrs
Varicella[10] (VAR)							←— 1st dose —→					2nd dose				

- 1st dose at 12 months
- 2nd dose at 4–6 years

- Minimal interval between doses of 3 months (12 months–12 years) or 4 weeks (≥13 years)

Varicella Vaccine

- **Vaccine effectiveness**
  - Single dose — post-licensure effectiveness = 70%–90%
  - Two doses — estimated efficacy = 98.3%
- **Breakthrough disease** **(case of WT infection >42 days since vaccination)**
  - Milder with fewer lesions
  - Single dose — ~15% in household settings
  - Two dose — 0.8% of recipients
- **Contagiousness following vaccination**
  - 1/3 as contagious if <50 lesions
  - Equally contagious as WT infection if >50 lesions

Varicella Vaccine Contraindications and Precautions

- Contraindications
- Precautions

Varicella Vaccine Contraindications and Precautions

- **Contraindications**
  - Severe allergic reaction (e.g. anaphylaxis) after previous dose or to a vaccine component
  - Known severe immunodeficiency (e.g., hematologic and solid tumors, chemotherapy, congenital immunodeficiency, long-term immunosuppressive therapy, or patients with HIV infection who are severely immunocompromised)
  - Pregnancy
- **Precautions**
  - Recent (<11 months) receipt of antibody-containing blood products (interval depends on product)
  - Moderate or severe acute illness with or without fever

Varicella Vaccine Adverse Events

Table 1: Fever, Local Reactions, and Rashes (%) in Children 1 to 12 Years of Age 0 to 42 Days After Receipt of a Single Dose of VARIVAX

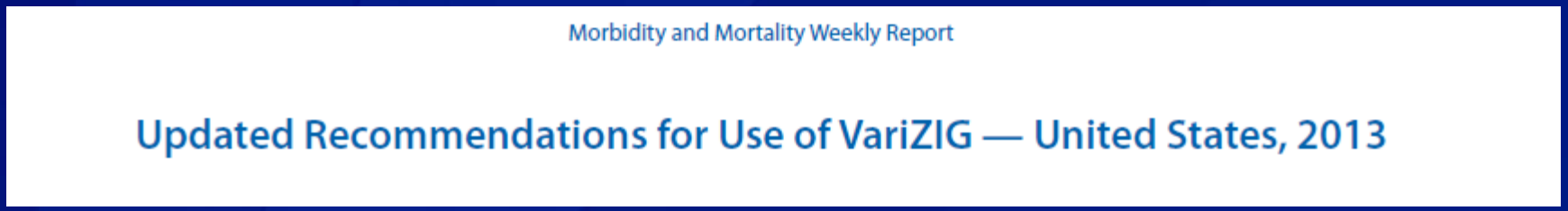
Reaction	N	% Experiencing Reaction	Peak Occurrence During Postvaccination Days
Fever ≥102.0°F (38.9°C) Oral	8827	14.7%	0 to 42
Injection-site complaints (pain/soreness, swelling and/or erythema, rash, pruritus, hematoma, induration, stiffness)	8916	19.3%	0 to 2
Varicella-like rash (injection site) Median number of lesions	8916	3.4% 2	8 to 19
Varicella-like rash (generalized) Median number of lesions	8916	3.8% 5	5 to 26

http://www.merck.com/product/usa/pi_circulars/v/varivax/varivax_pi.pdf

Varicella Vaccine Adverse Events

- **≥1% (most common → least common)**
  - Upper respiratory illness, cough, irritability/nervousness, fatigue, disturbed sleep, diarrhea, loss of appetite, vomiting, otitis, diaper rash/contact rash, headache, teething, malaise, abdominal pain, other rash, nausea, eye complaints, chills, lymphadenopathy, myalgia, lower respiratory illness, allergic reactions (including allergic rash, hives) stiff neck, heat rash, arthralgia, eczema/dry skin/dermatitis, constipation, itching.
- **<1%**
  - Pneumonitis
- **<0.1%**
  - Febrile seizures

Varicella Zoster Immune Globulin (VZIG)



- **Immunoglobulin G used for post-exposure prophylaxis**
- **VariZIG (Cangene Corporation, Winnipeg, Canada) only preparation available in United States for varicella post-exposure prophylaxis**
- **May 2011 – FDA approved extended period for administering VariZIG**
  - Patient should receive VariZIG as soon as possible and within 10 days of exposure to varicella zoster virus
  - Intramuscular injection
  - 125 IU/10 kg of body weight, up to a maximum of 625 IU

VZIG

- **VZIG administered following exposure to varicella or herpes zoster**
- **ACIP recommends administering VZIG to those without evidence of immunity**
  - History of healthcare provider diagnosis or verification of history of varicella or herpes zoster, documentation of vaccination, laboratory evidence of immunity or confirmation of disease
- **Patient groups:**
  - Immunocompromised patients without evidence of immunity
  - Pregnant women without evidence of immunity
  - Newborns whose mothers have signs of varicella 5 days before–2 days after delivery
  - Certain premature infants*

Varicella in Post-Vaccine Era

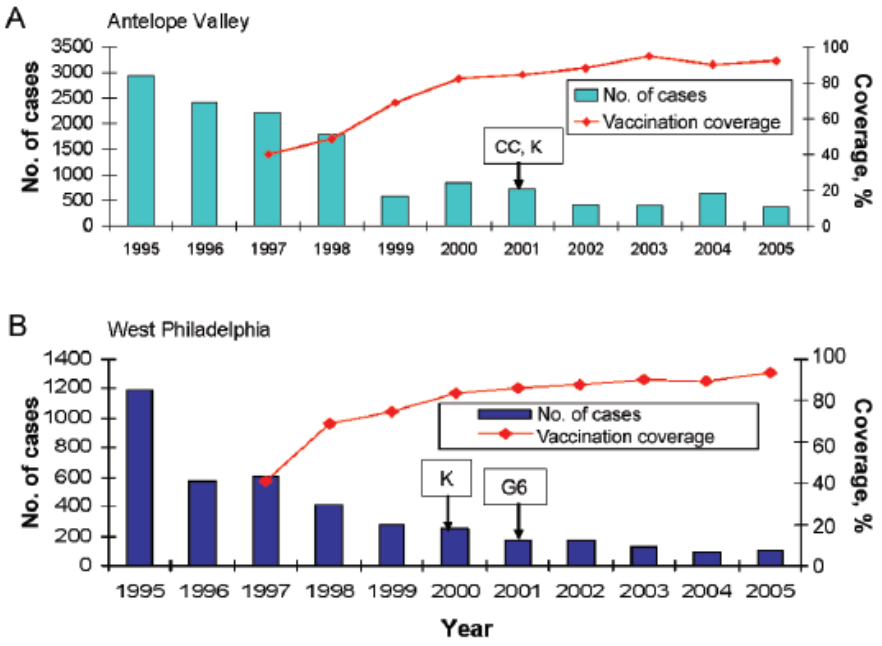


Figure 1. No. of cases and vaccination coverage, Antelope Valley, California *(A)*, and West Philadelphia, Pennsylvania *(B)*, 1995–2005. Boxes with arrows indicate when varicella vaccination requirements for child care (CC), kindergarten (K), and sixth grade (G6) entry went into effect.

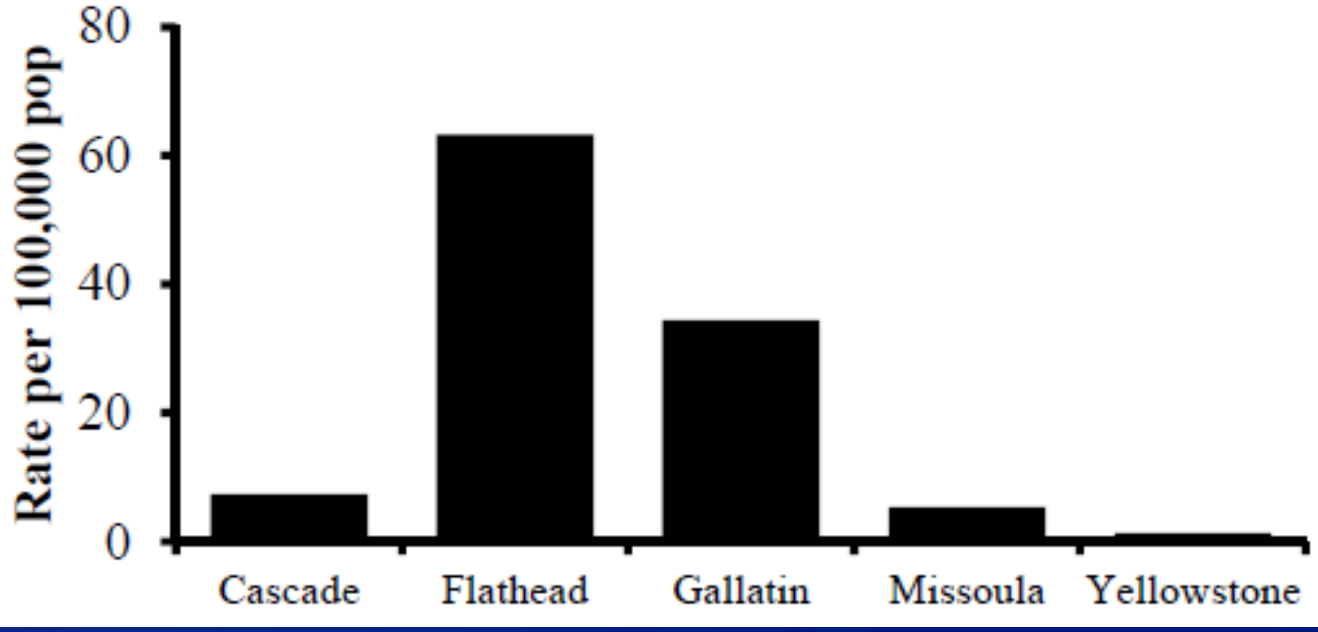
http://jid.oxfordjournals.org/content/197/Supplement_2/S71.full.pdf+html

Varicella in Montana

- Immediately reportable to local health department (ARM 37.114.101)
- Local health departments must report cases to DPHHS within 7 days (ARM 37.114.101)
- 1 dose of varicella vaccination by age 19 months required for child care attendance
- No varicella vaccine requirement to attend grades K–12

Varicella in Montana

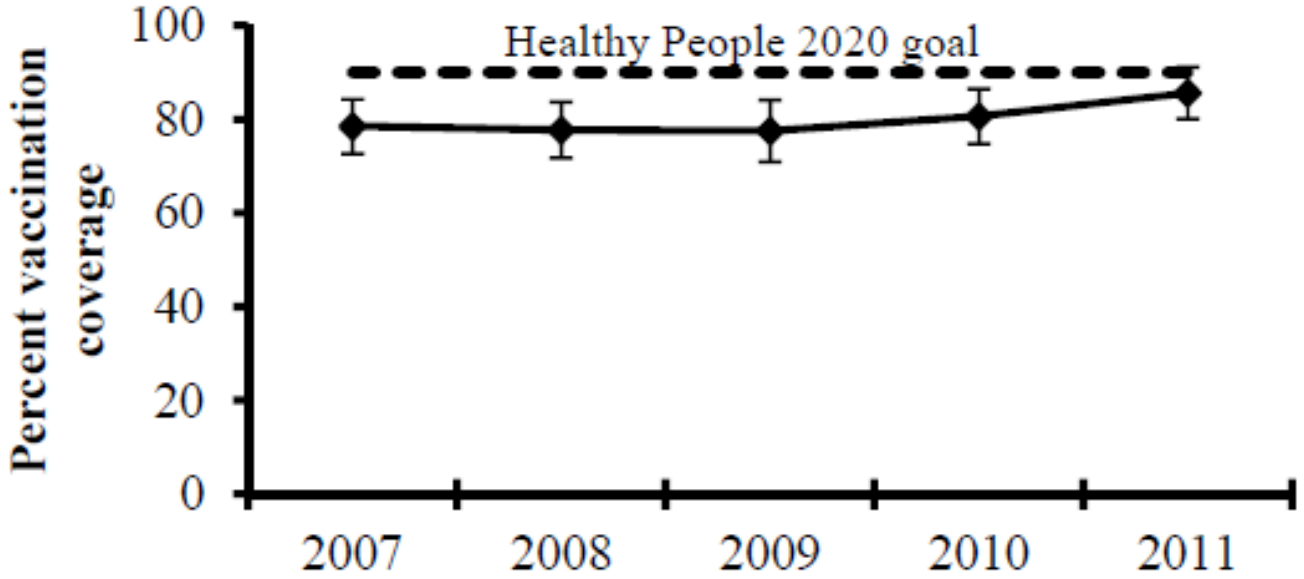
Figure 1. Annual average rate of varicella case reports for Montana's five most populous counties, 2007 to 2011



http://www.dphhs.mt.gov/publichealth/cdepi/documents/January2013-Varicella.pdf

Varicella in Montana

Figure 2. Varicella vaccination coverage for Montana children aged 19 to 35 months during 2007 to 2011, and Healthy People 2020 goal for percentage of U.S. children vaccinated against varicella



http://www.dphhs.mt.gov/publichealth/cdepi/documents/January2013-Varicella.pdf

Improving Varicella Vaccination Coverage in Montana

- Do not miss opportunities to vaccinate!
- Use imMTtrax
- Reminder/recall systems
- Change school entry requirements?

HERPES ZOSTER (SHINGLES)

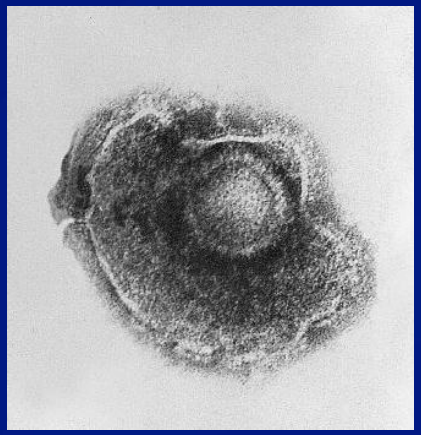
Herpes Zoster (Shingles)

http://www.cdc.gov/shingles/about/photos.html

http://theartofnotworking.blogspot.com/2013_10_01_archive.html

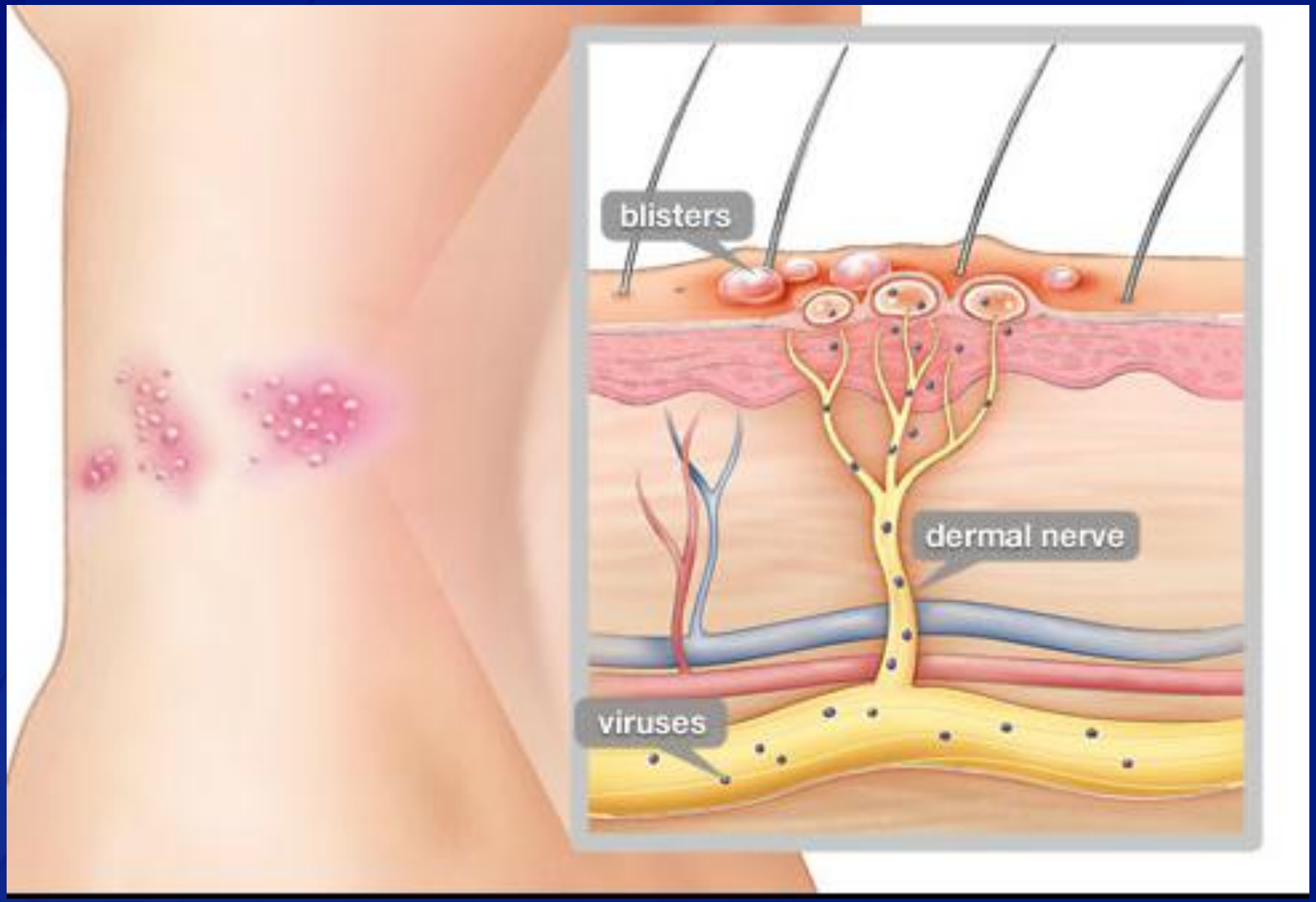
Herpes Zoster (Shingles)

- **Varicella-zoster virus (VZV)**
  - Human herpes virus type 3 (HHV-3)
- **Reactivation of virus in the dorsal root ganglia of the nerves**



http://en.wikipedia.org/wiki/File:Varicella_(Chickenpox)_Virus_PHIL_1878_lores.jpg

- **Occurs years after primary infection, and can occur after vaccination**
- **Majority of affected persons only suffer one episode, but 2 to 3 episodes possible**



http://www.webmd.com/skin-problems-and-treatments/shingles/ss/slideshow-shingles-pictures

Clinical Description

- Erythematous maculopapular rash with associated pain, pruritus, and paresthesias
- Prodromal phase can occur (HA, photophobia, malaise)
- One or two adjacent dermatomes
- Usually does not cross midline
  - 20% cases overlap adjacent dermatomes
- Develops into clusters of vesicles over 3–5 days
- Clusters progressively dry and crust over, heals in 2–4 weeks

http://www.webmd.com/skin-problems-and-treatments/shingles/ss/slideshow-shingles-pictures

Complications

- **Disseminated zoster (affecting ≥3 dermatomes)**
  - Most common in those with compromised immune systems
- **Postherpetic neuralgia (PHN)**
- **Acute or chronic ocular sequelae**
- **Bacterial superinfection of the lesions**
- **Cranial and peripheral nerve palsies**
- **Meningoencephalitis**
- **Pneumonitis**

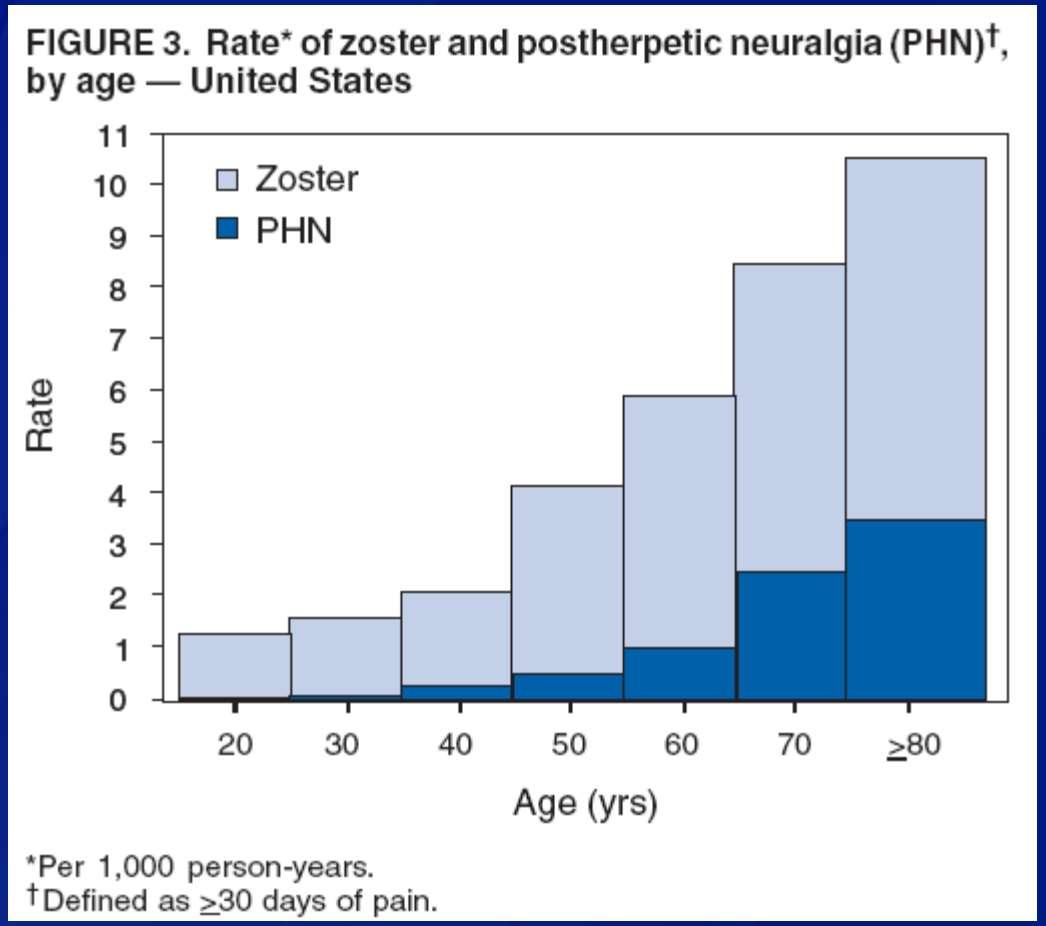
Post Herpetic Neuralgia (PHN)

TABLE 1. Impact of acute herpes zoster and postherpetic neuralgia on quality of life

Life factor	Impact
Physical	Chronic fatigue
	Anorexia and weight loss
	Physical inactivity
	Insomnia
Psychological	Anxiety
	Difficulty concentrating
	Depression, suicidal ideation
Social	Fewer social gatherings
	Changes in social role
Functional	Interferes with activities of daily living (e.g., dressing, bathing, eating, travel, cooking, and shopping)

http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5705a1.htm

Post Herpetic Neuralgia (PHN)



http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5705a1.htm

Treatment

- **Therapy should be initiated at the earliest sign or symptom of HZ infection**
- **Most effective when begun ≤72 hours of rash onset**
- **HZ confined to one dermatome (normal or compromised immune system)**
  - Acyclovir 800 mg PO 5 times daily for 7-10d, OR
  - Famcicyclovir 500 mg PO TID for 7d, OR
  - Valacyclovir 1000 mg PO TID for 7d
- **Visceral, CNS, or disseminated HZ, and in severely immunocompromised**
  - Acyclovir 10 mg/kg IV q8h 7-10d (adults)

Herpes Zoster Epidemiology

- **Pre-varicella vaccination era**
  - 99.5% of adults aged ≥40 years showed serological evidence of VZV infection ≈ nearly every adult at risk for HZ
  - 1.2 to 6.5 cases/1000 person years
  - Risk factors: immunocompromised, age ≥50 years, White race, female sex, psychological stress
  - Lower risk for those exposed to varicella or children, and for those who have been vaccinated
- **Post-varicella vaccination era**
  - 2 studies reported no change in incidence, 1 reported increase in HZ incidence
  - Previous models predicted HZ incidence would increase 5-7 years after varicella vaccination program, and last 30-50 years

Herpes Zoster Vaccination

- Herpes zoster vaccine (ZOSTAVAX®, Merck & Co., Inc.)
- FDA Approval in 2006
- Same Oka/Merck strain of live, attenuated VZV used in varicella vaccines
- 0.65 ml dose given subcutaneously in deltoid region of upper arm
- 14X greater potency than VARIVAX® and similar potency to PROQUAD®
- Booster dose not licensed

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Vaccine Schedule

- FDA approved for use in adults aged ≥50 years
- ACIP recommends 1 dose for adults aged ≥60 years

VACCINE ▼ / AGE GROUP ►	19-21 years	22-26 years	27-49 years	50-59 years	60-64 years	≥ 65 years
Zoster[6]					1 dose	

Vaccine Warnings and Cautions

- VZV transmission possible between vaccinees and susceptible contacts
- Consider deferring vaccination in persons with acute illness
- Avoid pregnancy for 3 months following vaccination

Vaccine Adverse Reactions

- **Most common**
  - Pain, erythema, swelling at injection site
- **Less common**
  - Pruritus
  - Warmth
  - Hematoma
  - Induration
- **Serious adverse events 0–42 days post vaccination ≈ 1-2%**

Vaccine Contraindications

- History of anaphylactic reaction to gelatin, neomycin, or any other vaccine component
- Immunosuppression or immunodeficiency
- Pregnancy

Vaccine Efficacy

- **Study of 38,546 adults for mean 3.1 years**
  - Randomized to receive vaccine or placebo
- **Vaccine group had 51% lower risk of developing zoster**
- **73% efficacious in preventing post-herpetic neuralgia (PHN)**
- **Reduced incidence of PHN by 39% in those that developed rashes**
- **Mean severity of PHN decreased by 57%**
- **Vaccine efficacy highest among those aged 60-69 years and decreases slightly with age**

Vaccine and Transmission of VZV to Contacts

- Theoretical concern
- No evidence in clinical trials of transmission of vaccine virus from vaccine recipients to contacts

Improving Vaccine Coverage

- Check immunization status of all adult patients aged ≥60 years at every patient encounter
- Reminder/recall

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